REMARKS

Claims 16-27 are allowed and claims 1-15 and 28-33 stand rejected. The Applicants sincerely thank the Examiner for the allowance of claims 16-27. Claims 10 and 15 are amended, and claim 13 is cancelled. After entry of this amendment, claims 1-12 and 14-33 will be pending. Claim 10 is amended to improve the form of the claim and to more particularly point out the invention. Support for this amendment is found in paragraphs **[0035]** and **[0062]**. Support for the amendments to claim 15 is found in paragraph **[0062]** and in original claim 12. The undersigned believes these amendments do not add new matter.

Rejections under 35 U.S.C. § 103

Claims 3, 4, and 28-33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,408,084 by Brandorff et al. (hereinafter "Brandorff") in view of U.S. Patent No. 5,519,513 by Copenhaver et al. (hereinafter "Copenhaver"). The Examiner cites Brandorff for disclosing a two-dimensional barcode reader that includes a CCD camera assembly, a shroud that blocks ambient light from entering the imaging camera and an illumination assembly of LED lamps within the shroud to illuminate computer-readable code at an angle such that light reflected from the illumination source is not directly reflected from the surface to the camera, and states that Brandorff fails to teach a photopic imaging camera. The Examiner cites Copenhaver for disclosing a photopic camera, and asserts that it would have been obvious to employ a photopic camera with a tungsten-halogen lamp so as to control light efficiency of the imaged data. The Applicants respectfully traverse the Examiner's position.

Claim 3 was previously amended to incorporate the limitations of claim 1 in response to the Allowable Subject Matter indicated on page 4 of the Office action mailed 11/05/02. The Applicants believe claim 1 is allowable, and refer to the arguments provided below in support of claim 1 regarding whether Brandorff discloses an illumination source disposed at an angle to avoid specular reflection of light from a surface with a computer-readable code. The Applicants also believe that claim 3 is

allowable for at least the reasons given below in support of claim 1. The Applicants believe claims 3 and 4 are further patentable for the following reasons.

Brandorff discloses and claims a two-dimensional array of LEDs for illuminating a surface. Brandorff states that each LED is a red LED, selected for energy efficiency (Col. 3, lines 61-63), and operates the LEDs in a flashing fashion to conserve power. Brandorff goes on to explain that the flashing imaging sequence consumes only 0.042 joules of energy per flash, and that this low power consumption allows the apparatus to operate with in internal power source, such as a rechargeable battery pack, making the apparatus portable (Col. 4, lines 13-19). Copenhaver states that use of tungsten-halogen lamps "typically convert a considerable part of their power to heat" and provides multiple cooling fins to remove the heat (Col. 11, lines 49-53). Thus replacing the LED array with a tungsten-halogen lamp would be undesirable because of the reduced efficiency and heat generated.

Furthermore, there is no reasonable expectation found in the prior art that replacing the LED array with a tungsten-halogen lamp would be successful. Brandorff discloses that the LEDs are triggered to flash from discharging capacitors so that "[t]he entire imaging sequence is completed before the 1 millisecond timing circuit in controller **190** expires" (Col. 6, lines 60-62). There is no suggestion that tungsten-halogen lamps could be substituted for the LEDs and still be triggered in such a fashion.

Similarly, Brandorff also states that "using a two-dimensional array of LEDs . . . permits diffuse illumination radiating from the LEDs to reach a surface to be imaged without "hot spots" or "shadows"" (Col. 7, lines 1-4, *see also* Col. 1, lines 34-54). There is no teaching or suggestion in the prior art that the substitution of the LED array with a tungsten-halogen lamp would provide the desired diffuse illumination. Absent such diffuse illumination, hot spots and/or shadows may occur (Col. 1, lines 34-38).

Use of a narrow-band light source, such as an LED array, especially in combination with a narrow bandpass filter, teaches away from using a photopic camera. The Examiner states that the advantage of the photopic camera is to spectrally correct the illumination and provide adequate imaged data visible to the human eye upon scanning/reading of the display. However, the apparatus of Brandorff is directed at

providing the scanned image to a processing unit (*see* Abstract), not to a human eye, hence there is no motivation to provide adequate imaged data visible to the human eye.

It is the Applicants' position that no *prima facie* case of obviousness has been made. Considering Brandorff as a whole, and considering Copenhaver as a whole, there is no motivation to modify the primary reference in the manner suggested by the Examiner. Modification of the apparatus of Brandorff as suggested the Examiner would alter fundamental operating characteristics of the apparatus, such as diffuse lighting and energy efficiency. The primary reference teaches away from the modification suggested by the Examiner, and no reasonable expectation of success has been established. Therefore, the Applicants believe claim 3 and all claims that depend from claim 3 are allowable.

Claim 4, which depends from claim 3, recites an optical filter disposed between the imaging camera and the surface that transmits more relatively blue and red light than green light to the imaging camera. The Examiner states that Copenhaver teaches an optical filter to reduce the brightness, attenuate the certain wavelengths from the lamps to give a desired spectral output, citing Col. 12, lines 21+. Copenhaver does not disclose or suggest the filter recited in claim 4.

In paragraph **[0052]** the Applicants teach that photopic cameras, which are monochrome ("black-and-white") cameras, are designed to mimic the color response of the human eye. Imaged with a photopic camera, the green component of a white pixel on a color display will be brighter than the red and blue components. In paragraph **[0055]** the applicants also teach that an optical filter that preferentially transmits red and blue light can be used to balance the effective spectral response of a photopic camera when used with the filter to scan a color display screen. Thus, the Applicants teach the particular desirability of using the filter recited in claim 4 with the photopic camera recited in claim 3 and believe claim 4 is further patentable.

Claims 10-14 and 15 stand rejected as being unpatentable over U.S. Patent No. 6,347,163 by Roustaei (hereinafter "Roustaei"). The Examiner states that Roustaei discloses a system for reading two-dimensional images using ambient and/or projected light, which includes a scanner with a photodetector and illumination lamp, measuring

light from the electronic display with the photodetector, and if the measured light is below a selected threshold, turning on the illumination lamp and scanning the computer-readable image from the electronic display. The Examiner further states that Roustaei fails to disclose the method step of the above configuration, and that it would have been obvious for one skilled in the art to create a program containing the step of scanning the computer-readable code from the display. The Applicants respectfully traverse the Examiner's position.

Claim 10, as amended, recites, among other elements, coupling a shroud to a surface of an electronic display to exclude ambient light; measuring light from the electronic display with a photodetector to determine whether the electronic display is an emissive display, and turning on an illumination lamp if the electronic display is not an emissive display. As discussed in paragraph **[0045]** if no emitted light is detected, then the system presumes the display is a reflective display. It is particularly desirable to exclude ambient light when scanning reflective displays because reflective displays often do not have anti-reflective coatings, and are especially susceptible to glare (*see, e.g.* paragraph **[0009]**).

No shroud is disclosed or suggested in Roustaei, and Roustaei does not appreciate the need to distinguish between emissive and reflective displays. Roustaei teaches away from the present invention because he appears to rely on ambient light to illuminate the images he scans (Col. 6, lines 15-16 and 24-27). Accordingly, the Applicants believe claim 10 and all claims that depend from claim 10 are allowable.

Claim 12, which depends from claim 10, recites that an imaging camera is the photodetector, *i.e.,* the imaging camera can be used to detect whether the electronic display is an emissive display. Roustaei discloses using a photodiode 203 to measure the illumination level near the detector 206, which appears to be an imager, and does not disclose or suggest using the imager to detect whether an electronic display is an emissive display. Therefore the Applicants believe claim 12 is further patentable, and that claim 15 is patentable for similar reasons.

Arguments in Support of Claim 1

The Examiner states that the Applicant's arguments mailed on January 6, 2003 have been fully considered, but are not persuasive. The issue appears to be whether the apparatus disclosed in Brandorff includes an illumination source disposed at an angle to avoid specular reflection of light from a surface with a computer-readable code. The Examiner acknowledges that the apparatus of Brandorff optionally includes a polarizer/analyzer. Brandorff states that "the polarizer/analyzer eliminates substantially all glare caused by specular light reflecting off the target surface" (Col. 5, lines 38-39). The Examiner is further directed to Col. 5, lines 15-18, wherein Brandorff states that "a polarizer/analyzer may be employed to enhance the clarity of the image obtained from the target surface." It is the Applicants' position that this indicates the illumination source of Brandorff creates specular reflection off the target surface and therefore is not disposed at an angle to avoid specular reflection of light from the scanned surface. The Applicants believe claim 1 and all claims that depend from claim 1 are allowable, and respectfully request reconsideration of claim 1.

Arguments in Support of Claim 2

Claim 2 recites the scanner of claim 1 wherein the imaging camera has a spectral response variation of less than 25% from about 400 nm to about 700 nm. The Examiner asserts that Brandorff does not specify the spectral range of the narrow bandpass filter, that one of skill in the art would recognize that visible light is between 400 nm and 700 nm, and that it would have been obvious to add this limitation to the teaching of Brandorff.

As discussed above in support of claim 3, Brandorff states that the LED array is made up of red LEDs chosen for their excellent energy efficiency (Col. 3, lines 62-63). These LEDs emit light in a selected region of the spectrum, namely red light, and any imaging camera selected to operate with such LEDs would not need a wide spectral response, but only a response to red light. The spectral response variation across the visible spectrum would be largely irrelevant. Brandorff teaches away from using a wide-response imaging camera, because such cameras would be more susceptible to the image

distorting effects of light not provided by the LEDs (*see* Col. 5, lines 32-35), and further teaches away from the present invention by suggesting an optional narrow bandpass filter, which would transmit only light in the emission spectrum of the LEDs to the CCD imaging elements (Col. 5, lines 30-32).

In contrast, the Applicants teach that imaging cameras with a wide spectral response are desirable for imaging "white" pixels from color displays, which are typically composed of red, green, and blue subpixels. A wide spectral response is particularly desirable in order to avoid Moiré patterns (*see* paragraph **[0036]**). Therefore the Applicants believe claim 2 is further patentable.

Arguments in Support of Claim 5

Claim 5 recites, among other elements, a scanner with a shroud configured to place the scanner at a selected oblique angle relative to a surface and an illumination lamp disposed within the shroud at an angle such that light from the illumination lamp is not directly reflected from the surface to the imaging camera. As with claim 3, claim 5 was previously amended to incorporate the limitations of claim 1 in response to the Allowable Subject Matter indicated on page 4 of the Office action mailed 11/05/02 and therefore is allowable for at least the reasons provided above in support of claim 1.

The Examiner states that it would be obvious that the shroud of Brandorff is configured to hold the scanner at an oblique angle relative to the surface. The Applicants respectfully direct the Examiner's attention to Fig. 1 of Brandorff, which shows the scanner normal to the surface of the target, and not oblique to it. Furthermore, Brandorff states that the "[s]hroud 300 has a generally vertical opaque sidewall" (Col. 5, lines 42-43). It is the Applicants position that the shroud of Brandorff is not configured to hold the scanner at an oblique angle relative to the surface, as stated by the Examiner.

The Applicants further assert that the recited element of the illumination lamp disposed to illuminate the computer-readable code at an angle such that light from the illumination lamp is not directly reflected from the surface to the imaging camera is not disclosed or suggested in the cited art. The Examiner asserts that one of ordinary skill in the art would agree that the projected lights are not always reflected back to the same

projected angle when striking a surface; however, this is not what is recited in the claim. If the Examiner is saying that the angle of reflection does not equal the angle of incidence, the Applicants respectfully request either supporting facts, or an affidavit in accordance with MPEP § 2144.03 if this position is based on the Examiner's personal knowledge.

The Applicants believe claim 5 is patentable and respectfully request reconsideration of claim 5.

Arguments in Support of Claim 8

Claim 8 was previously amended to incorporate the limitations of claim 1 in response to the Allowable Subject Matter indicated on page 4 of the Office action mailed 11/05/02 and therefore is allowable for at least the reasons provided above in support of claim 1.

Arguments in Support of Claims 6, 7, and 9

Claim 6, which depends from claim 1, recites a scanner wherein the imaging camera is disposed a distance *d* from the surface and has a camera imaging area with an image width of 2*s*, the imaging area having a first edge and an opposite edge, wherein the illumination lamp is disposed beyond, relative to the imaging camera, a limit line extending from the first edge or the opposite edge at an angle from normal to the surface, the angle being greater than the inverse tangent of *s*/2*d* (*see* Fig. 1B and associated Written Description). Generally, the illumination source should be above a limit line 31 starting at an edge of the imaged region 33 and extending away from the screen at an angle from normal of inverse tangent (*s*/2*d*). This configuration avoids specular reflections into the camera (paragraph **[0042]**).

The Examiner originally cited Brandorff against claim 6, acknowledging that Brandorff did not disclose any specific distance of the cameral above the surface. In the second Office action, the Examiner cited U.S. Patent No. 5,567,934 by Zheng et al. (hereinafter "Zheng") for disclosing a scanning apparatus similar to the apparatus of Brandorff with camera viewing range of 2.5 inches. The Examiner stated that it would

have been obvious to one of ordinary skill that the distance "*d*", in order to have a viewing angle of 13 degrees or greater, would have to be more than 7 cm and achievable. However, this is not the standard for patentability.

Claim 6 was originally rejected under 35 U.S.C. § 102(e). Since the Examiner has admitted that Brandorff does not disclose the elements recited in claim 6, the undersigned will assume that claim 6 currently stands rejected as being anticipated by Zheng, since neither the current or previous Office actions provide a different statutory basis for the rejection of claim 6.

Zheng states that the camera is mounted three inches above the bottom edge of the shroud and has a field of view 2.5 inches across (Col. 7, lines 12-14). Thus, "*d*" is 3 inches and "*s*" is 1.25 inches. However, this merely discloses the viewing angle and distance of the camera. Zheng does not disclose or suggest all elements recited in claim 6, particularly the position of the illumination source in relation to the camera, and therefore cannot anticipate claim 6.

Zheng also discloses a polarizing film that "eliminates the effect of specular reflection of light from the surface" (Col. 4, lines 36-37). It is the Applicants' position that this disclosure indicates the flash tube of the apparatus of Zheng, similar to the LED array of Brandorff, creates specular reflections, *i.e.* the flash tube is not disposed beyond the recited limit line. Zheng teaches away from the present invention by providing polarizers to eliminate specular reflections. The present invention teaches an apparatus that avoids creating specular reflections. Accordingly, the Applicants believe claims 6, 7, and 9 are allowable.

Conclusion

In view of the foregoing, the Applicants believe all claims pending in this Application are in condition for allowance, and that the Applicants are entitled to the claims in accordance with the Title 35 of the United States Code and Art.1, §8, cl.8 of the Constitution of the United States. The Applicants respectfully request reconsideration of all pending claims, the withdrawal of all rejections, and the issuance of a formal Notice of Allowance at an early date.

If the Examiner believes this amendment does not put all pending claims in condition for allowance, the undersigned invites the Examiner to telephone the undersigned at (707) 591-0789.

Respectfully submitted,

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